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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/910,732	07/24/2001	Peter Schramm	012050-077	1789

27045 7590 10/31/2005

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EXAMINER	
MERED, HABTE	

ART UNIT	PAPER NUMBER
2662	

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/910,732	SCHRAMM, PETER	
	Examiner	Art Unit	
	Habte Mered	2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-67* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *53-66* is/are allowed.

6)☒ Claim(s) *1,4,19,20 and 35-41* is/are rejected.

7)☒ Claim(s) *2,3 and 5-18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07/24/2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03/08/2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-67 are examined.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claims 1, 19, and 37-41** are rejected under 35 U.S.C. 102(e) as being anticipated by Sudo et al (US 6, 747, 945), hereinafter referred to as Sudo.

Sudo teaches an OFDM transmitting and receiving apparatus whereby power between the subscribers at a reception time can be maintained substantially constant so as to improve an error rate characteristic.

4. Regarding **claim 1**, Sudo discloses a link quality determination unit for determining a link quality of a transmission link between an OFDM transmitter and an OFDM receiver of an OFDM transmission system, wherein: the link quality determination unit **(Figure 19, element 401)** comprises a signal power variation determining unit adapted to determine the signal power variation of the reception signal in the receiver **(Column 12, Lines 4-10)** and at least a first link quality measure determination unit adapted to determine a first link quality measure representing the variation of the sub-carrier signal power on the basis of the signal power variation as

determined by the signal power variation determining unit **(Column 11, Lines 55-67 and Column 12, Lines 1-16)**.

5. Regarding **claim 19**, Sudo discloses a link quality determination unit, wherein: the OFDM symbols are transmitted in bursts of a frame, each burst **(Column 10, Line 52)** comprises a preamble part and one or more protocol data units **(standard data transmission method in TDMA/CDMA/OFDM)** and each preamble part of each burst comprises one or more OFDM training symbols **(Preambles are meant for synchronizing and always contain training symbols known by the receiver)** used by the channel coefficient estimator for the channel estimation **(Figure 3, Element 162 estimates channel coefficient and see also Column 4, Lines 24-28)**.

6. Regarding **claim 37**, Sudo discloses a transmission link property decider **(Figure 8, elements 249-252)** for selecting transmission properties of an OFDM transmission link depending on a transmission link quality measure, wherein: the transmission link property selector **(Figure 8, elements 249-252)** comprises a link quality determining unit **(Figure 8, elements 245-248)** for outputting the link quality measure, and the transmission link property decider is adapted to decide on the transmission properties of the transmission link on the basis of the link quality measure output by the link quality determination unit. **(See Fourth Embodiment – Column 6, Lines 35-55)**

7. Regarding **claim 38**, Sudo discloses a selector, wherein: the transmission link property decider is adapted to decide, on the basis of the link quality measure, as the transmission property the physical layer mode used for the OFDM transmission. **(See Fourth Embodiment – Column 6, Lines 35-55)**

8. Regarding **claim 39**, Sudo discloses a selector, wherein: the transmission link property decider is adapted to decide between different physical layer modes by using a hysteresis. **(Column 6, Lines 45-57)**

9. Regarding **claim 40**, Sudo discloses a selector **(Figure 8, elements 249-252)**, wherein: the transmission link property decider is adapted to decide, on the basis of the link quality measure, as the transmission property the transmission power used for the OFDM transmission. **(Column 6, Lines 35-55)**

10. Regarding **claim 41**, Sudo discloses A link quality determination method for determining a link quality of a transmission link between an OFDM transmitter and an OFDM receiver of an OFDM transmission system comprising the following steps: determining the signal power variation; and determining at least a first link quality measure on the basis of the determined signal power variation. **(Column 11, Lines 55-67 and Column 12, Lines 1-16. See also Figure 19, element 401)**.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims **4, 20, 35, 36, 46 and 67** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo et al (US 6, 747, 945), hereinafter referred to as Sudo, in view of Balachandran et al (US 6, 108, 374), hereinafter referred to as Balachandran.

13. Regarding **claim 4**, Sudo teaches a link quality determination unit for determining a link quality of a transmission link between an OFDM transmitter and an OFDM receiver of an OFDM transmission system **(Column 11, Lines 55-67 and Column 12, Lines 1-16 and Figure 19, element 401)**.

Sudo however fails to disclose that the link quality determination unit comprises a signal-to-noise variation determining unit adapted to determine the signal-to-noise variation of the reception signal in the receiver and at least a first link quality measure determination unit adapted to determine a first link quality measure representing the variation of the signal-to-noise ratio on the basis of the signal-to-noise variation as determined by the signal-to-noise variation determining unit.

Balachandran discloses a system and method for measuring channel quality information based on signal to noise ratio.

Balachandran discloses that the link quality determination unit comprises a signal-to-noise variation determining unit adapted to determine the signal-to-noise variation of the reception signal in the receiver **(Figure 3, element 56 and Column 4, Lines 34-40; Column 5, Line 58-60; Column 6, Lines 1-5)** and at least a first link quality measure determination unit adapted to determine a first link quality measure representing the variation of the signal-to-noise ratio on the basis of the signal-to-noise variation as determined by the signal-to-noise variation determining unit **(Figure 6, step 102 and Column 6, Lines 42-67)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sudo's apparatus to incorporate a link quality

determination unit that is based on measuring the signal-to-noise ratio, the motivation being to use SNR measurement as it is the most widely accepted performance measurement in wireless system as stated in Balachandran Column 2, Line1.

14. Regarding **claim 20**, Sudo discloses a link quality determination unit, wherein: the OFDM symbols are transmitted in bursts of a frame, each burst **(Column 10, Line 52)** comprises a preamble part and one or more protocol data units **(standard data transmission method in TDMA/CDMA/OFDM)** and each preamble part of each burst comprises one or more OFDM training symbols **(Preambles are meant for synchronizing and always contain training symbols known by the receiver)** used by the channel coefficient estimator for the channel estimation **(Figure 3, Element 162 estimates channel coefficient and see also Column 4, Lines 24-28)**.

15. Regarding **claim 35**, Sudo teaches all aspects of the claimed invention as set forth in the rejection of claim 1 but fails to teach a link quality determination unit, further comprising: a noise power determination unit adapted to determine the noise power; and a second link quality measure determination unit which is adapted to determine a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit; and wherein the link quality determination unit comprises an overall link quality measure determination unit for determining an overall link quality measure by combining the first and second link quality measures.

Balachandran discloses a link quality determination unit, further comprising: a noise power determination unit adapted to determine the noise power **(Figure 12,**

element 202); and a second link quality measure determination unit which is adapted to determine a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit **(Figure 12, element 204)**; and wherein the link quality determination unit comprises an overall link quality measure determination unit for determining an overall link quality measure by combining the first and second link quality measures **(Figure 12, element 206). (See Column 11, Lines 1-35 for further discussion)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sudo's apparatus to incorporate a link quality determination unit that is based on measuring the signal-to-noise ratio using a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit, the motivation being to use SNR measurement as it is the most widely accepted performance measurement in wireless system as stated in Balachandran Column 2, Line 1.

16. Regarding **claim 36**, Sudo teaches all aspects of the claimed invention as set forth in the rejection of claim 4 but fails to teach a link quality determination unit, further comprising: a noise power determination unit adapted to determine the noise power; and a second link quality measure determination unit which is adapted to determine a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit; and wherein the link quality determination unit comprises an overall link quality

measure determination unit for determining an overall link quality measure by combining the first and second link quality measures.

Balachandran discloses a link quality determination unit, further comprising: a noise power determination unit adapted to determine the noise power **(Figure 12, element 202)**; and a second link quality measure determination unit which is adapted to determine a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit **(Figure 12, element 204)**; and wherein the link quality determination unit comprises an overall link quality measure determination unit for determining an overall link quality measure by combining the first and second link quality measures **(Figure 12, element 206)**. **(See Column 11, Lines 1-35 for further discussion)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sudo's apparatus to incorporate a link quality determination unit that is based on measuring the signal-to-noise ratio using a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit, the motivation being to use SNR measurement as it is the most widely accepted performance measurement in wireless system as stated in Balachandran Column 2, Line 1.

17. Regarding **claim 67**, Sudo discloses a transmission link property selector **(Figure 8, elements 249-252)** including a transmission link property decider (Figure 8, elements 245-248) for selecting transmission properties of an OFDM transmission link

depending on a transmission link quality measure, wherein: the transmission link property selector comprises a link quality determining unit **(Figure 8, elements 245-248)** for outputting the link quality measure, and the transmission link property decider is adapted to decide on the transmission properties of the transmission link on the basis of the link quality measure output by the link quality determination unit. **(See Fourth Embodiment – Column 6, Lines 35-55)**

18. Regarding **claim 46**, Sudo teaches a link quality determination method for determining a link quality of a transmission link between an OFDM transmitter and an OFDM receiver of an OFDM transmission system **(Column 11, Lines 55-67 and Column 12, Lines 1-16 and Figure 19, element 401)**.

Sudo however fails to disclose a method further comprising the steps of: determining the signal-to-noise variation; and determining at least a first link quality measure on the basis of the determined signal-to-noise variation.

Balachandran discloses a method further comprising the steps of: determining the signal-to-noise variation **(Figure 3, element 56 and Column 4, Lines 34-40; Column 5, Line 58-60; Column 6, Lines 1-5)**; and determining at least a first link quality measure on the basis of the determined signal-to-noise variation **(Figure 6, step 102 and Column 6, Lines 42-67)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sudo's apparatus to incorporate a link quality determination unit that is based on measuring the signal-to-noise ratio, the motivation

being to use SNR measurement as it is the most widely accepted performance measurement in wireless system as stated in Balachandran Column 2, Line1.

Allowable Subject Matter

19. **Claims 2, 3, 5-18, 21-34, 42-45, and 47-52** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. Regarding **claim 2**, the cited references taken individually or in combination fail to particularly disclose the signal power variation determining unit is adapted to determine, as the signal power variation, the signal power variance by determining the difference between the power of the estimated channel coefficients on the respective sub-carrier and the signal power, by determining the absolute value of the difference, by squaring the absolute value of the difference, and by averaging the squared absolute value over a plurality of sub-carriers.

21. Regarding **claim 3**, the cited references taken individually or in combination fail to particularly disclose link quality measure determination unit is adapted to determine the first link quality measure by determining a ratio of the signal power variation to the squared signal power.

22. Regarding **claim 5**, the cited references taken individually or in combination fail to particularly disclose a noise sample estimate-determining unit, which is adapted to determine a noise sample estimate for each sub-carrier in each OFDM symbol; wherein the signal-to-noise variation determining unit is adapted to determine as the signal-to-

noise variation the signal-to-noise variance by determining a SNR mean value by respectively summing the power of the channel estimation coefficients and the power of the noise samples over the plurality of sub-carriers and by forming the ratio thereof and by determining the ratio of the power of the respective channel coefficient estimate for the respective sub-carrier to the power of the respective noise sample estimate for the respective sub-carrier, by subtracting from this ratio the SNR mean value, determining the absolute value of the subtraction result, squaring the absolute value and averaging the determined absolute values over a plurality of sub-carriers.

23. Regarding **claims 6 and 7**, the cited references taken individually or in combination fail to particularly disclose a noise power determination unit adapted to determine the noise power; and a second link quality measure determination unit which is adapted to determine a second link quality measure representing the average sub-carrier signal-to-noise power ratio on the basis of the noise power as determined by the noise power determination unit.

24. Regarding **claim 14**, the cited references taken individually or in combination fail to particularly disclose noise sample estimate determining unit is adapted to determine the noise sample estimates for each sub-carrier in each OFDM symbol on the basis of the respective received signal sample on the respective sub-carrier in the respective OFDM symbol, of sub-carrier symbol information about the sub-carrier symbol transmitted on the respective sub-carrier in the respective OFDM symbol, and of the channel coefficient estimate on the respective sub-carrier.

25. Regarding **claim 42**, the cited references taken individually or in combination fail to particularly disclose the steps of determining the noise power.

26. Regarding **claim 43**, the cited references taken individually or in combination fail to particularly disclose determining a modified second link measure as a cumulative density function.

27. Regarding **claim 44**, the cited references taken individually or in combination fail to particularly disclose the signal power variation determining unit is adapted to determine, as the signal power variation, the signal power variance by determining the difference between the power of the estimated channel coefficients on the respective sub-carrier and the signal power, by determining the absolute value of the difference, by squaring the absolute value of the difference, and by averaging the squared absolute value over a plurality of sub-carriers.

28. Regarding **claim 47**, the cited references taken individually or in combination fail to particularly disclose a noise sample estimate-determining unit, which is adapted to determine a noise sample estimate for each sub-carrier in each OFDM symbol; wherein the signal-to-noise variation determining unit is adapted to determine as the signal-to-noise variation the signal-to-noise variance by determining a SNR mean value by respectively summing the power of the channel estimation coefficients and the power of the noise samples over the plurality of sub-carriers and by forming the ratio thereof and by determining the ratio of the power of the respective channel coefficient estimate for the respective sub-carrier to the power of the respective noise sample estimate for the respective sub-carrier, by subtracting

from this ratio the SNR mean value, determining the absolute value of the subtraction result, squaring the absolute value and averaging the determined absolute values over a plurality of sub-carriers.

29. Regarding **claim 49**, the cited references taken individually or in combination fail to particularly disclose noise sample estimate determining unit is adapted to determine the noise sample estimates for each sub-carrier in each OFDM symbol on the basis of the respective received signal sample on the respective sub-carrier in the respective OFDM symbol, of sub-carrier symbol information about the sub-carrier symbol transmitted on the respective sub-carrier in the respective OFDM symbol, and of the channel coefficient estimate on the respective sub-carrier.

30. Regarding **claims 51 and 52**, the cited references taken individually or in combination fail to particularly disclose the steps of determining the noise power.

31. **Claims 53-57 and 60-66** are allowed.

32. Regarding **Claims 53-57and 60-66** are allowable over the prior art of record since the cited references taken individually or in combination fail to particularly disclose a noise sample estimate-determining unit, which is adapted to determine a noise sample estimate for each sub-carrier in each OFDM symbol; and a noise sample averaging unit which is adapted to determine the noise power by averaging the noise sample estimate power over one or more sub-carriers; wherein the noise power determining unit is further adapted to determine the noise power by averaging the noise sample estimate power also over one or more OFDM symbols; and wherein the noise sample estimate determining unit is adapted to determine the noise sample estimates

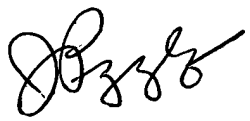
for each sub-carrier in each OFDM symbol on the basis of the respective received signal sample on the respective sub-carrier in the respective OFDM symbol, of sub-carrier symbol information about the sub-carrier symbol transmitted on the respective sub-carrier in the respective OFDM symbol, and of the channel coefficient estimate on the respective sub-carrier.

Conclusion

33. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Habte Mered whose telephone number is 571 272 6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571 272 3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



JOHN PEZZLO
PRIMARY EXAMINER

09-30-2205
HM